

Session: Physics

Chaotic Plasma Synchronization

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Certain chaotic oscillators are able to have their phases synchronized with the phase of a periodic oscillator. In this phase synchronized state, the phases of the two oscillators are in step with each other while their amplitudes remain uncorrelated. The phenomenon has been demonstrated numerically and also has been observed experimentally.

Not only can a chaotic oscillating signal be phase synchronized with a periodic oscillator, but also with another chaotic signal. This chaotic-chaotic synchronization has been demonstrated with such oscillators as the Chua and the plasma circuit. A number of different possible setups are available to attempt to synchronize chaotic systems.

Two such methods are the small perturbation technique, and the use of two competing signals. In parameter space the Arnold tongue is an important tool for visualization of regions of phase synchronous and phase nonsynchronous regimes.

In this talk both simulation and experimental results will be shown for the chaotic-chaotic synchronization process.